

REMARKS

The office action of June 19, 2007, has been carefully considered.

It is noted that claims 1-8 are rejected under 35 U.S.C. 103(a) over the patent to Haberkamm et al. in view of the patent to Rosenthal et al.

It is respectfully submitted that the claims presently on file differ essentially and in an unobvious, highly advantageous manner from the constructions and methods disclosed in the references.

For the conventional 4-high and 6-high stand designs, in addition to basic conceptual designs with bending systems and fixed roller cambers as roll gap affecting control elements, there are essentially two further stand concepts, which by shifting working rolls and/or intermediate rollers, based on different effect principles, additionally influence the roll gap:

- CVC/CVC^{plus} - Technology
- Technology of strip edge-oriented shifting.

In this regard, separate stand conceptual designs are involved, since different roll geometries are necessary.

In the conventional CVC - technology, as is described in the EP 0 049 798 B1, the barrel lengths of the shiftable rollers are always longer than the stationary unshifted rolls by the amount of the axial shifting stroke. As a result, the barrel edge of the shiftable roll cannot be pushed under the stationary roll barrel. Thus, surface defect/markings are avoided. The working rolls are supported in the general along their entire length at the intermediate or back-up rolls. Thereby the rolling force exerted by the back-up rolls is transferred to the entire length of the working rolls. This has the consequence that the ends of the working rolls which are lateral to the rolling stock and thus not involved in the rolling procedure are deflected towards the rolling stock by the rolling force exerted on them. From this harmful deflection of the working rolls an upward bending of the middle roll sections results. This in turn results in insufficient rolling out of the central region of the strip and an excessive rolling out of the strip edges. These effects particularly come into play when rolling conditions vary during operation, as well as when rolling strips of different widths.

In contrast, with the technology of band edge-oriented shifting, as described in DE 22 06 912 C3, in the entire roll set rolls with same barrel lengths are used. The shiftable rolls are correspondingly geometrically configured on one end in the barrel edge region and provided with a set back, in order to reduce locally arising load peaks. The effective principle is based on the strip edge-oriented readjustment of the barrel edge, ahead of, at, or even after the strip edge. In particular with 6-high roll stands, the shifting of the intermediate rolls under the back-up roll allows the effectiveness of the positive work roll bending to be influenced in a systematic way. However, the axial shifting of the rolls has an unfavorable effect on the load distribution in the contact joints. With decreasing strip width, there is a serious increase in the maximum load peak of the contact force distribution.

There is the tendency to realize these technology/driving designs with different rolling geometries via a stand concept with geometrically uniform roll sets. The fundamental process for the realization of a strip edge-oriented shifting strategy excluding the intermediate rolls and exclusively in a 6-high roll stand using a geometrically uniform roll stand was already

described in Haberkamm et al. in detail. The object of the present invention was thus formulated to expand from the well-known band edge-oriented shifting strategy in such a way that a stand conceptual design with geometrically identical set of rolls is realized.

An important advantage now also of the stand conceptual design is that with only a geometrically identical roll set the CVC/CVC^{plus} - technology as well as the technology of band edge-oriented shifting can be realized, whereby roll geometry is reduced to only a single one, which an individual cross section or a combination of the cross sections is overlaid in each case. Thus each mode of operation can be covered with only one geometry. Thus, there are substantially reduced costs of the roller support. Furthermore, now the additional positive effect results that the cross section on the working roll works directly at the roll gap and not only transferred indirectly over the working roll onto the strip.

Thus the passage grid controllance is substantially better. In particular within the strip edge region there is a direct influence of the strand profile (additional Edge drop control

member). This refers both to 6-high roll stands, and to 4-high roll stands.

A procedure for the influence of the strip outline within the edge region of a rolled strip is described by Rosenthal et al., in which by overlaying a conventional CVC cross section the disruptive edge effect of a roll tapered on one end is compensated on the body region of the roll gap, so that as working rolls separate CVC rolls are used and their camber is determined with the help of an off-line computation. By a separate CVC roll is understood a roller with a shaping that outgoing from a tapered end has a course of diameter differences of a Continuously Variable Crown (CVC), which such a profile in axial direction that exhibits during its axial shift the released unwanted portion of the effect of the conical taper, i.e. change of the flexible behavior of the roll set is compensated. Measures and/or characteristics, which lead to the claimed invention, are not taught by Rosenthal et al. Thus, among other things, Rosenthal et al. do not teach or suggest shiftable intermediate rolls or rolls with a barrel lengthened by the CVC shifting distance with one sided setback in the area of the barrel edge.

Applicant respectfully submits that neither of these references, nor their combination, teach the method and apparatus as recited in the claims presently on file

In view of these considerations it is respectfully submitted that the rejection of claims 1-8 under 35 U.S.C. 103(a) over a combination of the above-discussed references is overcome and should be withdrawn.

Reconsideration and allowance of the present application are respectfully requested.

Any additional fees or charges required at this time in connection with this application may be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450 Alexandria, VA 22313-1450, on November 19, 2007.

By:


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